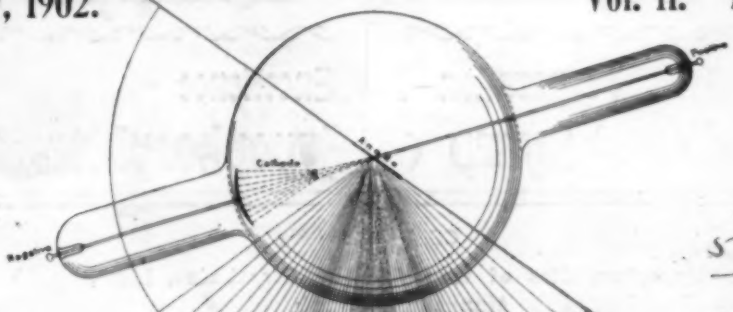
SIXTH YEAR.

July, 1902. Vol. 11. No 1.



AMERICAN X RAY JOURNAL

CHARLES P. RENNER, Editor

ST. LOUIS, U. S. A.

THE AMERICAN X-RAY JOURNAL

Devoted to Practical X-Ray Work and Allied Arts and Sciences.

PUBLISHED MONTHLY BY THE AMERICAN X-RAY PUBLISHING COMPANY

CHARLES P. RENNER, M. D., M. E., Editor.

SUBSCRIPTION RATES—IN ADVANCE.

United States, Canada and Mexico	$3.00	Foreign Countries	$4.00
Single Copies	25	Single Copies	35

Editorial matter should be addressed to Dr. Charles P. Renner, Editor, Suite 301 Chemical Bldg., St. Louis.

All business matter should be addressed to the American X-Ray Journal Publishing Co., same address.

All contributors of original articles and other matter relative to X-Radiance, of interest to the medical profession, are solicited from all parts of the world. Contributors will be furnished a liberal number of extra copies of the JOURNAL containing their articles.

Translation of articles written in German, French and Spanish is made by Frank Ring, M. D., 611 Chemical Building, St. Louis, Mo.

Entered at the Postoffice at St. Louis, Mo., as Second-Class Matter.

VOL. 11. *ST. LOUIS, JULY, 1902.* *No. 1.*

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FRED S. O'HARA, M. D.,
Springfield, Ill.

THE AMERICAN
X-RAY JOURNAL.

Devoted to Practical X-Ray Work and Allied Arts and Sciences.

VOL. 11. *ST. LOUIS, JULY, 1902.* *No. 1.*

The Practical X-Ray Diagnosis.

Prepared by J. Rudis-Jicinsky, A. M., M. D., M. E.
Cedar Rapids, Ia. Revised by M. U. Dr.
Joseph Hoffman, Vienna Austria.

A series of A B C teaching for workers in x-ray diagnosis and therapeutics, to be concluded in 20 articles. Fully illustrated.

Tesla Transformers.

LESSON VI.

When in 1895 Prof. William Conrad Roentgen made known his wonderful discovery, scientific men the world over sought new methods for the generation of the remarkable x-ray. In no country was greater enthusiasm shown than in this country, but Germany still leads in all that pertains to the new method of correct diagnosis. Prof. Roentgen gave his opinion about the source of the x-ray in his communication, as follows:

Preliminary communication to the Wuerzburg Physico-Medical Society, December, 1895.

"After experiments bearing specially on this question, it is certain that the spot on the wall of the discharge apparatus, which fluoresces most decidedly, must be regarded as the principal point of the radiation of the x-rays in all directions. The x-rays thus start at the point at which, according to the researches of different investigators, the cathode rays impinge upon the wall of the glass tube. If one deflects the cathode rays within the apparatus by a magnet it is found that the x-rays are entitled from another spot—that is to say, from the new termination of the cathode stream—I therefore come to the conclusion that the x-rays are not identical with the cathode rays, but that they are generated by the cathode rays at the glass wall of the discharge apparatus."

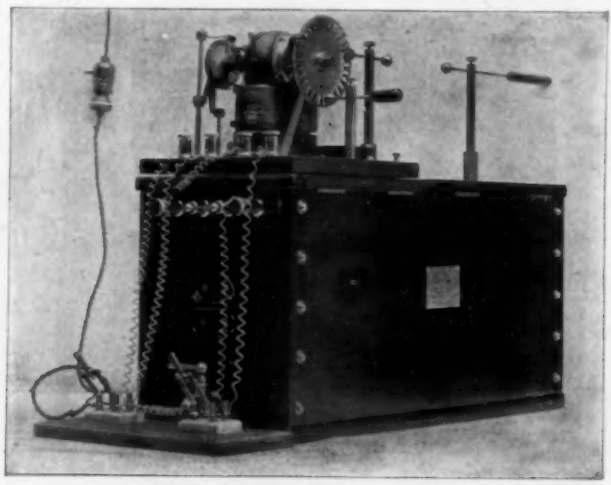
This opinion was followed and the perfection of the primitive coil made the aim of all experimenters. When Tesla took up x-ray work, and gave us his coil, he contributed to the art of Radiology very much, because the source of electricity in operating this coil was very large, the experimentation could progress little further and brought out the theory that the x-ray is at least anticathodic and begins not only at the fluorescent spot on the glass bulb, but the point of any substance placed within the tube, where the cathodic rays strike. The extraordinary power of Tesla's high potential, high-frequency coil was demonstrated by him and others. The x-rays produced by the use of his coil are such that the dry-plate may be affected at a distance of forty feet.

With Tesla's apparatus we have to have his transformer consisting of an induction coil having but few widely separated turns of primary wires, the secondary wires being highly insulated and in few numbers and use oscillatory electrical currents. The coil may be

connected with Leyden jars and we get discharges of high frequency of alteration. If we wish to, the Tesla coil may be connected with the Leyden jars on a Static machine, and if it is of proper size, the x-rays produced this way in the tube are most beautiful. Such perfection of apparatus with the jars of the largest type, long spark-gape, for developing the x-rays, in such quantities and of such penetrating qualities, make them an indispensable diagnostic adjunct in every difficult case. The proper connections with jars and static are shown in May issue of this Journal.

pensed with, a current interrupter being used instead, but an Electrical Condenser, on account of its convenient form ease of operation and power of generating the highest degree of electromotive force may be added to our armamentarium.

The Electrical Condenser was invented by Volta, in the later part of the eighteenth century, and it is so called because its power of accumulating electricity, which is received in repeated charges from other bodies until quantities too minute in themselves to be otherwise perceptible, have been collected



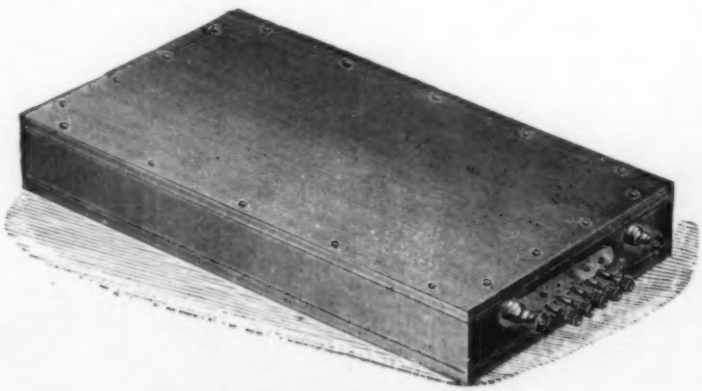
High Frequency Coil. Fig. 1.

Electrical Condenser.

In order to obtain satisfactory results in the use of coils for x-ray work, carefully constructed apparatus is required, one in which the windings of the primary and secondary coils are accurately proportioned. The insulation of the primary from the secondary must also be perfect, so as to prevent leakage, otherwise a short-circuit is produced and the efficiency of the coil is destroyed. On the coils made to run on the 110 and 120 volt circuit, the Vibrator is dis-

to any desired amount. The condenser of to-day is a great improvement upon the original air condenser introduced by Volta, although the electrical laws are the same. It is an apparatus whose function is to accumulate by induction a large or small amount of electricity, depending upon the capacity of particular instrument, on a comparatively small surface, and in short space of time. We may effect certain results with the condenser through the instrument upon which it is devised to act or utilize to absorb or divert what may be termed

"waste electricity," the surplus energy and obviate the spark at the contact points in connection with our coil. To increase the capacity of an adjustable condenser plugs are inserted, to decrease the same the plugs are removed. See illustration in May issue of this Journal.



Electrical Condenser. Fig. 2.

INTERRUPTER.

LESSON VII.

With the advancement of the x-ray technic the desire arose for knowledge to determine the conditions under which skiagraphs of the thicker parts of the body may be successfully taken—one of such conditions being the knowledge of the number of interruptions in our current used for generating the x-rays. As stated already, we can vary the number of particles in the vacuum tube by expelling gas from anode, or by a regulator which liberates, by the action of current upon a chemical, artificially gas. We can expel gas from anode by introducing a variable capacity discharge in anode end of the tube, and in this way lower vacuum, and by capacity discharge in cathode end and no discharge in anode end of the tube, may raise vacuum. By the regulation of these two capacities we can maintain the vacuum at a certain degree, and by varying the intensity of the current we have to understand the amount being expressed in so and so many amperes, volts at certain time. But such data of pressure and quantity of current given theoretically are quite worthless without the knowledge of the number of the interruptions of the coil or the static machine. To beginners, especially in the branch of x-ray technic, the interrupter will prove to be indispensable, and will also be essentially valuable in judging the efficiency of the apparatus. We have already stated that the value of a coil or static machine depends not simply on length of spark generally—efficiency must be estimated by the "maximum" spark-length of each "interruption" when the apparatus is working at very high speed. Thirteen to sixteen hundred interruptions per minute we consider a very good rate for skiagraphy and screen work; however, this rate can be increased to a speed of 2,000 interruptions per minute. At above stated speeds the light emitted from the x-ray tube will appear perfectly inert and steady upon the fluorescent screen. In order to be able to count the interruptions, we have to have a SPEED INDICATOR OR TACHOMETER. The indicator which is driven by a motor gives direct readings of the number of

interruptions per minute, without the AID OF A WATCH, ETC. There are many interrupters in the market and have different names. In the May issue of this Journal we gave an illustration of the rotatory interrupter, which consists of small electro-motor with an excentric disc, by which a silver rim is raised and lowered at great speed, thus making contacts in a mercury vessel. The motor and the glass vessel are mounted on a base. The later is further provided with two terminals for connecting the small accumulator battery intended for supplying the motor, and also a necessary switch. Platinum rapid interrupter is another device used in Germany with large coils especially. In this case no mercury is required, and the working of the apparatus is more clean. In France they use another device, but on the same principle. The interrupters in this country are made in accordance with the Wehnelt or Caldwell interrupters and seem to be much simpler; for instance, Mechanical Current interrupter, etc. Nearly in all of them brush or other mechanism closes the current through interruption when the platinum needle or wire is immersed to various lengths in mercury or some acid solution, and as the length of immersion determines the amount of current, its working principle is very simple. This gives the most delicate regulations, because the intensity of the current may be varied from zero to full capacity.

Very simple and efficient Mercury Jet Interrupter, the latest on the market, is the one of Cunningham. Unlike the well-known German turbine mercury jet interrupter and that of Boas, it contains no fluid non-conductor, such as alcohol, or oil, which may prolong the arc at the break, rapidly carbonize and contamine the mercury. The very good feature of this apparatus is the automatic manner in which it prevents the occurrence of an undue rise of current through the primary of our coil, when the motive power fails.

As to the interrupter with a static machine, there are many also, but the Monell's interrupters are satisfactory. These are to be secured upon the rubber handles of the sliding poles of the static machine, the sliding poles being drawn a foot or more apart, and connected by wires to the tube fixed in the tube-holder. The sliding handle of each interrupter should be adjusted so that the metallic ball is at first in actual contact with the outer brass ball of each prime conductor. The spark gap necessary to produce the best x-rays is regulated by drawing the sliding handles away from the prime conductors.

Spark Tester.

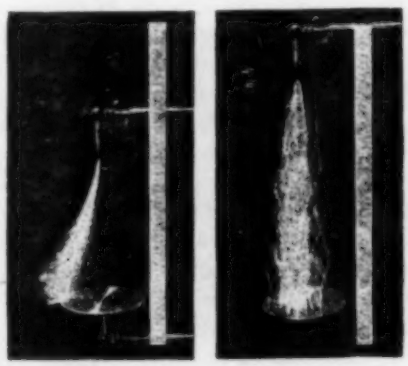
LESSON VIII.

It is always well to test the maximum spark length before each examination especially with the induction coil. When it is desired to make a proper test, discharges are used, consisting of spark point and disc as shown in our illustration. In starting the sparks place both stands at a distance of about two inches between disc and point and see whether the sparks are escaping from the point to the center of the disc. Then separate the stands to the fullest extent. With the static machine the sliding poles are the best testers, especially if they are drawn wide apart. If proper connections are made, the negative terminal connected by wire to the negative pole and the positive to the positive of the tube we may observe the short spark gape between the ball of the interrupters and the larger ball of each sliding pole. If we wish to, we may use Cleaves Current Controller with our sta-

tic machine and see the quantity or amperage which is desired with given periods. Beside the spark-tester in successful skiagraphy of ours, we have to remember IN EACH CASE ALL THE CHARACTERISTICS OF OUR SUBJECT,-noting precisely all the peculiarities, age, density and general structure, as to the muscle and fat. The latter are of great importance in determining the results of skiagraphy of the human body.

STAND FOR TUBES.
WITH WIRE-HOLDER.

For holding the tubes we have especially constructed wooden or metallic stand, adjustable, rigid, holding a tube without vibration, as shown



Spark Tester. Fig. 3.

in our illustrations. Some stands are about two metres high and consist of a heavy iron foot with a vertical rod, through which the clamp holding the tube may be in horizontal position, and the vertical rod, a movable wire-holder is fastened, which serves to support the conducting wires and to keep them away from the patient, so that the latter is in no danger to receive a shock. There can be no sparking from tube to stand. When a static machine is used, be horizontally adjusted. At the top of the common stand may be employed with a wooden adjustment for the tube and a bar with clamps for the wires. The wires have to be insulated, rubber tubing around them, which besides the common insulation proved very useful in various operations with x-ray. For hospitals with powerful apparatus that A. W. L. Universal tube holder, designed by Rollins is recommended. The tube in this case is held in a wooden box which is opaque to all x-ray except which comes through an adjustable round opening, and so confines the rays to go at the required size of area, of the object to be examined. In special box there is also a small lamp to warm the tube if necessary, and to reduce the vacuum.

THE CASKET.

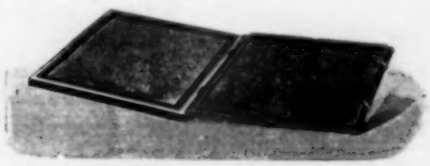
In skiagraphy we use a plate-holder for our dry plates or have the plates in black and yellow envelopes, but in the work with intensifying screens—or two of them if the photographic plate has two prepared sides—it is necessary to carry the plates into the dark room and there to wrap each plate in two or three sheets of non-transparent paper, otherwise we would be obliged to possess a great number of intensifying screens. This inconvenience is overcome by using a casket in the form as illustrated. The casket is supplied with number of card board frames to suit the different sizes of plates. The cover is constructed so as to prevent any influx of light.

LESSON IX.

THE DRY PLATES FILMS
AND SENSITIZED PAPER.

To obtain good results in skiagraphy we have to use fresh dry plates of high sensitiveness both as to light and to colors. We generally use highly sensitive Cramers x-ray plates, made expressly for x-ray work. The plates may be wrapped before exposure

in two envelopes, a dark one and another yellow of non-transparent paper. This way they are ready for use, the film side being marked. If a plate-holder or casket is used, we do not need the envelopes. If the tube is soft—low vacuum exposures on the extremities may be short without the intensifying screen, but if the tube is hard—high vacuum—exposures will require more time at a greater distance of the tube from the object. First we have to ascertain if the x-rays penetrate the parts to be skiagraphed with the fluoroscope in our hand, then stop the apparatus and bring our plate or film in. The plate is pushed under the part to be photographed, the side to be examined towards the film of the plate, the anode of the tube turned downward so that its center will be on a direct line with the center of the plate or film, at the given distance. After



The Casket. Fig. 4.

the exposure, remove the plate to a safe place or dark room, and develop the same. When parts are photographed, which perspire or produce much warmth such as the feet, the plate should be not only in envelopes, but in addition also wrapped in oil-cloth to be sufficiently protected against the influence of perspiration. A scratch on the plate or air bubbles must be avoided and recognized in time. Those who have some experience in photographing will do good to keep to the manner or custom of developing, fixing, intensifying, etc., with which they may be acquainted, because the handling of these plates does not differ in any way from that of regular brands. The developer which has given us the best results is the "Pyro Eikocum Hydro or J. C. Tabloids." The plates should be developed more than is generally the case with the ordinary plates. It is necessary to continue the developing until the picture appears distinctly. We have never seen any rules laid down for developing the x-ray plates, but we spoiled many a good picture by not continuing the development long enough. The developers named must be used much stronger than the formula given for ordinary plates and add two drachms of 10 per cent solution of bromide of potash as a restrainer instead of about ten drops as for ordinary plates. If we use the J. C. Tabloid's very convenient method, for the general practitioner, especially, we have to take three J and three C Tabloids and dissolve in five ounces of water, then add two drachms, 10 per cent solution of bromide potash. We also have some solution in stock of the tabloids made on hand to add if the picture is very slow in turning dark, and some extra bromide if it turns dark immediately, showing over-exposure. As to the printing of our pictures we may try it again, if we do not get a good picture, but if we do not develop a negative well, we cannot do it over. The dark room, which is needed can readily be established. We have one in our laboratory made like the vapor cabinet; it is very light and may be folded and is portable. After having developed the plate, wash it carefully and place into the fixing bath. Then put it into a basin of clean water, to remain for half an hour at least, to allow the soluble salts to leave the sensitive film. After this place the plate for drying. The pictures are copied in the usual way known in photography, viz., by sensitive paper (I prefer to print on matt velox paper), held against the plate in copying frame, and exposed to the light of the sun or day. When the copy on

the paper is satisfactory take it out of the frame and lay it into the fixing bath until the desired tone is attained. After this wash the copy during a couple of hours in water frequently changed and then dry it. When developing the plate fasten a small rubber clamp on each of its four corners in order to keep the plate from touching the bottom of the basin. The films with two sensitive sides should be developed in a tray the size of which should be considerably larger than that of the film. The developer should be used in large quantities. The films must be carefully washed by rocking the tray gently. In skiagraphy of the thick parts, abdomen, etc., the flexible films properly protected may be applied directly to the body and around the same if possible. In developing, the film should be often reversed to secure equal washing of both sides and to avoid adherence of air bubbles. This manipulation is greatly facilitated by bending two of the corners of the film, one upward and the other downward. The fixing, washing and copying is done the usual way. For the purpose of drying, the films may be suspended by means of clamps in the manner generally adopted in drying of paper prints. It is safest to copy the films in the sun rays to avoid the danger of blurring. In the dark room a ruby lamp should be lighted, but must be perfectly safe. The shutter of the lamp should be closed while the plate or film is being transferred from the envelope or casket to the developing tray. Shutter of the lamp should be so placed that it acts as a shade to the eyes of the operator, at the same time throwing the light into the tray. To prevent inequality of our negatives, the back of the plate is flowed with "Hance's substance of ground glass" and the thinner portions are evened up by rubbing burned umber into the same. The reason for the presence of little more than bone outline in many skiagraphs are under-exposed plates and lack of proper fixation, therefore watch all the steps of the development always very carefully and gradually the sought for image will come into view.

CARE OF DRY PLATES AND FILMS.

Care must be taken not to keep the plates or films in the same room where x-ray work is done. If packed in the paper envelopes, they may be affected on their sensitized surface or any simple scratch will be hidden before the eyes of the operator, beside the possible injury to their keeping qualities. It is better, therefore, to have the envelopes of black and orange colors separately, into which the plates can be readily inserted as required for use in the dark room of ours, and examined before the insertion. Keep the plates in a moderately lighted place which is free from dampness, sewer or illuminating gas or other contaminating odors. The porous nature of wooden or pasteboard boxes in which they are packed is well known. The temperature of the room where the plates or films are kept may vary between 60 to 100 degrees, but the lower temperature should be avoided, as the plates are liable to fog or sweat if the temperature changes from cold to warm, producing mould or scum on the gelatine film, which may be mistaken after developing the plate exposed to the x-ray for pathological conditions, etc. It is always good to see that the oldest numbers of plates are kept forward, to prevent stock becoming too old.

CAUSES OF NON-SUCCESS.

FOG—Film spoiled. The electrical connections not correct and rays produced too weak. Overexposure. Tube not steady and not at its best. White light entering casket, envelopes or dark room; too much light during develop-

ment; unclean trays; developer decomposed; too warm or containing too much carbonate of soda or potassium. Lack of proper fixation. Old plate. Some parts of the dress, especially silk, chamois skin, etc., or other substance more or less opaque to the x-ray, in the way. The radiance in the tube not instantaneously checked when through with exposure. (On the static we can prevent this, as stated already, by laying a metallic rod over the positive and negative of prime conductors and if a coil is used, by watching carefully over switch.) A slight simple fog can be removed by the red prussiate and hypo reducing solution.

WEAK NEGATIVES WITH CLEAR SHADOWS. Underdevelopment.

TOO STRONG WITH CLEAR SHADOWS. Underexposure, or too strong developer.

WEAK NEGATIVE WITH PLENTY OF DETAIL IN THE SHADOWS. Overexposure or too weak developer. Add some of the contrast developer to the normal.

TOO MUCH INTENSITY. Developer being excessively strong or too warm. Negatives dried in warm, sultry air assume more intensity than when dried in a cool place with draft.

FINE TRANSPARENT LINES. Due to scratches with nail or brush.

ROUND TRANSPARENT SPOTS. Air bubbles in the developer.

SPOTS OF IRREGULAR SHAPE. Caused by dust, temperature or sweat of the patient.

YELLOW AND BROWN STAIN OR IRRIDESCENCE OF THE SURFACE. Caused by decomposed pyro solution, insufficient or decomposed sulphite of sodium in developer; using the developer warmer or stronger in alkali than the plate will stand; also by plain hypo solution, which by continued use has assumed a dark color, or by insufficient fixing. The stain may be removed by applying the red prussiate and hypo reducing solution and the irridescent surface can be wiped off with a tuft of cotton while the negative is wet.

MOTTLED APPEARANCE OF NEGATIVE. Precipitation from the fixing bath containing alum, if the solution is old and turbid.

CRYSTALLIZATION ON THE NEGATIVE AND FADING IMAGE. Imperfect elimination of the hypo.

PECULIAR STREAKS AND BLOTCHES. In the shape of brush marks, finger marks and insensitive spots, appearing as though the plate has been scrubbed with a dirty or greasy brush or improperly cleaned, are caused by the uneven action of the developer or using of an intensifying screen of hard grain.

This trouble is more liable to occur if "Hydrochinone" is used in connection with Eikonogen or Metol; when the developer is too old or too much diluted, and can be prevented by a previous soaking of the plate in water, or by radical change to a different developer.

SENSITIZED PAPER. If we wish to make a positive, avoid breakage and printing, we may use specially made Eastman enamelled permanent bromide paper direct instead of a plate. The image appears then in the denser structures, bones, etc., WHITE. The paper in developing requires no special manipulation simply the exposure, development, fixing and washing. If we wish to have more prints, we have to simply expose the required number of sheets of the paper. As far as yet the exposure is somewhat longer in this case, but this and similar difficulties will be overcome soon, when better paper made accurately for our purpose will be put in market. The value and accuracy of the skiagraph, made this way is also

entirely dependent upon the experience and skill of the operator. We have no standard, excepting individual experience at the present time, to determine the proper working vacuum of our tube, and same to determine the length of exposure, when sensitized paper is used, but this method should be ready, convenient and less costly.

While no extravagant claims are made for this procedure, it being too early to assert positive values in every case, we are satisfied of the efficacy of some sensitized paper, especially in field work in military surgery.

In as much as Electricty has shown so much therapeutic benefit, in the treatment of Cancer, yet there are a few Medical Journals in this country that write of it in the negative. The following appeared in the *Carolina Medical Journal*, in November, 1901:

ELECTRICITY.—Electricity, which has promised so much in so many different fields of medicine, and which has practically yielded so little of positive therapeutic value, has been long, faithfully and variously employed in the treatment of cancer. Constant and uninterrupted currents have been applied, electrolosis and cataphores is used, and lastly the influence of the x-ray tested, all with practically negative results.

We are frequently called upon to comment such editorials, and have succeeded in winning over such Journals, that in the present time they are all writing of the x-ray therapy in the positive.

Dr. Eugene Corson presents a very interesting paper, captioned "X-Ray and Photographic Technique Necessary to Bring out Bone Detail in the Print."

A cablegram last week reported that Dr. Addyman in a lecture, delivered that week in London, said he had cured a bad case of cancer, by the action of the Roentgen rays.

Roentgen Society of America.

The next meeting of the American Roengen Ray Society will be held in Chicago, December 10th and 11th, and promises to be the best meeting in the history of the Society. A very fine program, which will be announced later, has been secured, and on it are several of the leading men of Medicine and Science. We will have a manufacturers' exhibit, showing the latest improvements and most approved forms of apparatus. The local preparations are in the hands of a most excellent Committee, as follows:

DR. RALPH R. CAMPBELL, *Chairman.*
414 Marquette Bldg., Chicago.

DR. JOHN B. MURPHY,
Reliance Bldg., Chicago.

DR. LOUIS E. SCHMIDT,
424 North State Street, Chicago.

DR. M. L. HARRIS,
100 State Street, Chicago.

DR. W. L. BAUM,
103 State Street, Chicago.

DR. H. G. ANTHONY,
465 Dearborn Ave., Chicago.

DR. W. A. PUSEY,
Columbus Memorial Bldg., Chicago.

For any particulars or information, write to either the Executive Committee or the Committee on Arrangements.

WESTON A. PRICE, D. D. S.
Chr. Ex. Com.

(*b*) X-Ray Narrative.

The Second of a Series of Articles by Dr. Fred S. O'Hara.

"One of the most amusing instances of the connection of my machine to crime," said Doctor Barsto, at the close of my second visit to him, "happened here about three years ago." I settled myself comfortably in the chair and prepared myself to hear another story, true beyond doubt, in which his Static Machine played an important part.

"To go back to the beginning, it was a worrisome fact that the police knew that there were more Swiss watches in the city than had ever been voluntarily admitted through the Custom House."

"My friend Olden had consulted me upon the matter from time to time but there was absolutely nothing suspicious that could be noticed among any of the passengers. All who were suspicious looking had been searched but nothing had been found. Still the watches appeared every thirty days, in regular order, and were as innocent looking as though they had come over in the regular channels. Olden had been detailed upon the case, to help the Goverment Inspector, and at the Customs office he had wearied his eyes and brains, trying for a solution of the mysterious smuggling. He had been there two months perhaps, before he came to me. After telling me the perplexity he was in, he begged me to "put him on" to the solution of the mystery. I had him to tell me every phase of the case, that he could remember. I asked him where the smuggled property had appeared, and above all, I asked him what else that particular firm handled, outside of the jewelry line. After a deep discussion he promised to come again the nexevening with a customs list of the importations of this firm. After Mr. Olden had departed I took my case and made a few visits in the city, and then came home to think over the matter, and try for a solution of the puzzle that had caused the officer so many sleepless nights."

"I was very busy next day, and I had completely dismissed the little problem from my mind. When a Surgeon has three or four cases upon which he must operate in a single day, they will give him enough to think about for a few days, and the outside world will trouble him not the least. So I retired that night with never a thought for Swiss watches, nor even Swiss cheese. I was aroused at about midnight by a violent hammering at the door, which I soon opened and found Mr. Olden sadly disarranged in clothing and not entirely free from sanguinary stains. One of his phalanges was broken, and his hand, so well as his face, badly cut up. It took me some little time to eradicate the traces of the encounter, and whilst I was working upon him he gave me the history of his mishap. He had copied off the list of stuffs that were imported by the firm of S—— and S—— that morning, and placed the copy into his hat, for safe keeping. At noon he looked for the list and it was gone. He remembered removing his headgear whilst examining the baggage of a lady that had come over in the steamer that had arrived that morning, but he had not laid it aside for more than five minutes altogether. The circumstance looked suspicious, the more so, because none but the fellow officers were about when the petty theft occurred. However he could not see how they could be connected in any way with the firm of S—— and S——. In the afternoon he had made out another list from the book of registration, this time making a carbon copy beneath the real copy. This copy he concealed in his revolver holster, whilst he placed the other in his hat as before. No one was in the room

at the time, but just as he went into the detention room, he met Detective Sparks, who passed into the room Olden had just quitted. Jack said that he had turned round as the door closed, and a tiny beam of light coming through the door had engrossed his attention for a few moments. Stepping to the door, he could see a tiny peephole that had been cleverly bored, and from which place, the observer could see the desk upon which lay the customs register. Sparks was now looking at that book, as if to make sure what Olden had been copying.

"'I thought that I would give him a run for his money'" said Jack, "'so I hung my hat on a peg, and awaited results. It was easy to conceal myself in the pile of baggage and packing cases that were in the room. After a little while Sparks came into the room. He glanced around casually, whistled a tune as he sat upon a packing case, he leaned back and bumped into the wall with a crash. Of course my cap fell down, and attracted by the noise, he started to pick it up. I arose from my place of concealment, and said 'I'll take charge of that hat if you please.'" He handed it to me courteously, but when I looked for the list copy, both it and Mr. Sparks were gone.

'At quitting time, I repaired to the toilet room, and placed the carbon copy within my shoe. Then I got my supper, and started for here, and here I am, though the worse for wear. After I left the restaurant I noted that there were a pair of tough looking customers in my wake, but I thought that I could "flip them," and I took a roundabout path, that unfortunately landed me in the toughest quarter in the city. Well, you can see the result of the fray, but I know of a couple of men that are in the City Hospital, and are likely to be there for some time, and I did not use my black jack until they had pounded me almost senseless. When I found my hat, I felt a pressure from the inside of the sweat band when I put it on. I staggered up to a light and examined, there was a note, in a strange hand. Here it is.'" I opened the paper that he handed me and this is what it contained.

"'Olden. Keep yer durned hans out of ther custims or ye will get yer dose, worsen this next time.'"

"A light began to dawn upon me. The note was misspelled by intention, and was written with the left hand. And upon heavy ruled bond paper, that must have come from some business house.

"'Search the waste basket tomorrow morning, there in that room where you made your copy, Jack, and you will find the remainder of this sheet of paper, for I could see that it was the work of Sparks, and made when Olden had gone from the room in the afternoon.

"Now for the Importers list. This ought to explain the difficulty we are in. There is evidently a strong reason why this copy is stolen so often though fruitlessly. Nothing looked bad, until I came to silks and satins. "In what kind of packages, do these come, Jack," I queried. "Long, rolled up over a board, replied the late unfortunate." "How thick a board?" "About an inch thick, and a foot wide." "Get a package of that silk and bring it to my office at eight o'clock tomorrow evening. I'll send it back to the house, in as good shape as that in which I receive it, and what is more, you will not need to take the wrapping off." Olden's unclosed right eye, began to twickle with suspicion. 'I see Dock, going to test the bolt with the ray?"

"Bring it, my boy," said I "and we will find some of those dear little Swiss movements, I am sure."

"I will not bore you with the details of how Jack managed to sneak out of the Custon House with a bolt of silk, and how he eluded the men that were in the employ of Sparks, and were upon the

watch for him. Jack will tell you for himself, some evening when you happen to meet him here, (for he comes quite often.) But at a few minutes after eight, next evening, he carried a bolt of silk, heavily wrapped into my office. I darkened the room, connected the apparatus, started the motor, then turned out the lights and awaited the green blush of the tube. I was obliged to reverse the connections, before the tube would work, but soon everything was in fine shape for the experiment. I knew within my very soul, that the thickness of wood in the center of the bolt of silk was for no other purpose than that of concealing something from the watchful eyes of the Inspectors.

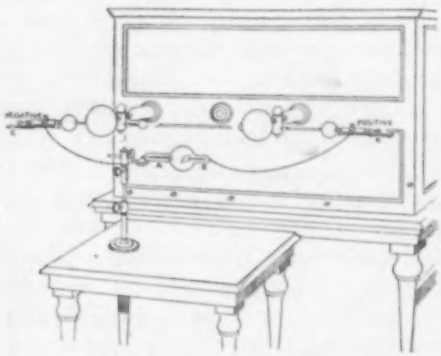
Well, I was honestly astonished at the sight that the tube revealed. Watches packed so closely together, that it was hardly possible to see the light between them. And all in this innocent looking bolt of dress goods. I let Jack take a look, and he whistled in astonishment. "Dock, old boy, you have made my reputation in the past, and it surely looks as though you are going to keep it up for me in the future."

"I bad him think no more of it, and gently dismissed him for the night. However, I admonished him to tell me how the case came out."

He was back next evening with the flush of triumph upon his face. "I am winner," said he "but they fought hard."

"Tell me the denouement," I requested.

"Now to come back to the static machine, I want to tell you just how it was used in this case. This apparatus has twelve revolving plates and they are 32 inches in diameter. It is capable of dis-



charging voltage into the millions, but the quantity of electricity (ampere) is very small. I used this Crooke's tube in this case and the machine was "hitched up," as you see it now. The current at first came in improperly, that is in reversal, and I changed the poles by changing the tube so that the positive current entered the tube at the positive end. It is not

at all in doing x-ray work. The fluoroscope, as you see is so arranged that you necessary now-a-days to darken the room

see the thing you seek without day-light entering or interfering. The bolt of silk was about eight inches thick and the board about one inch. The ultra-violet, or x-rays, or Roentgen ray, as it is called, readily go through cloth and wood, that is, this character of fibre is transparent to the ray. Metal is either translucent or opaque and therefore absorbs the rays. The watches being opaque, no rays passing through, they showed up black upon the screen in the fluoroscope. To get this view I placed the bolt of cloth against the fluoroscope, the tube being six inches from the bolt. The plates of the machine were revolved with electric motor power. I did not require great radiance and therefore had my plates revolving rather slowly for x-ray work. This was controlled by rheostat which regulated the speed of the motor. Instantly I saw the shape of watches, and at once was convinced."

"This morning I told the boss that I had located a part of the smuggled watches," continued Olden, "and for him to have a couple of men at the Custom House to assist me in case I needed them. I sent for Messrs. S. & S. to whom the goods we had examined had been consigned. When they had arrirved, I took them to the detenroom out on the wharf, and showed them their cases of imported stuffs, requesting them to give me permission, to open a few packages, to see that the silks were of standard length. The packages felt so heavy that the length of the piece must have been increased a few yards. The senior member of the firm turned a sickly yellow, and said that he did not care if he paid a little more duty, and that he would prefer that the goods be measured in the store. I assured him that whilst we were commanded to be courteous aud obliging to all those who had occasion to transact business with us, it was absolutely necessary that I open the goods there and then.

In presence of the clerk of the house, whom I had summoned, I stripped the wrapper from the silk. I rapidly unfolded the goods until I came to the wooden core. It was mean of me to do it, but I wanted to prolong the agony for a few minutes, so I laid the board aside and began to measure the silk with the utmost care. I had just about finished the task, when Sparks came into the room, and with a quick glance at the scene of action, walked into our midst. Picking up the board he dealt me a friendly blow upon the gluteal region,

and in an instant, the air was full of Swiss movements. The jig was ended and I called my assistants to arrest the firm of S. & S. who were cringing before me, on the charge of smuggling. And turning to Mr. Sparks I casually remarked, that his little ruse had not saved him at all, and he would pleased to accompany the officers under the charge of complicity in smuggling."

"The whole affair was exposed this afternoon, by confession of the detective, who turned State's evidence to save himself. There was not a bolt of silk nor of satin come in for three yeers, consigned to S. & S. but had been loaded. He confessed to me that he had slapped me with the board to cause the board to break and disclose the concealed articles,

and at the same time prove his entire innocence, but I was too much for him, and he cheerfully admitted the fact.

The thugs that waylaid me, were to frighten me, and incidentally load my hat with the cheerful little message, which I heeded not."

"Jack looked triumphant as he sat there where you are now sitting, lighting his cigar. After he had finished his story. He thanked me warmly for the interest I had taken in the case, and queried what an x-ray machine like mine would cost, as he was thinking about buying one for his individual use." "I am tired of bothering you so much" said he, "but in the future, no case will pass by me, that is not probed by the x-ray.

"I thanked the Doctor warmly for his story and bade him good night, for I knew that he was tired and sleepy. My disease was gradually yielding to his skill and care, but I made up my mind that sick or well, I wanted to hear some more of his narrations of Mr. Olden and himself, in the field of crime.

SPRINGFIELD, ILL.

The AMERICAN X-RAY JOURNAL (St. Louis) for May comes in a new dress with the name of Chas. P. Renner, M. D., as editor, Dr. Heber Roberts presumably retiring. However, from appearance one would think "it is the voice of Jacob but the hand of Esau." Bro. Roberts will undoubtedly be still heard thru this ever-interesting journal.—*Journal of Gynecology and Surgery, St. Louis.*

We thank you, Bro. Lamphear, for this notice and trust you may award us with more extended ones later on. Matter of x-ray interest we will gladly read in your most valuable journal.

When you read, let the selection be light, which will avail you something useful.

Dr. Kellogg, of the great Battle Creek, Mich., Sanitarium, has purchased the static machine, formely owned by Dr. Gardner of Washington, D. C. This machine was made by Waite & Bartlett Manufacturing Co., and is the largest machine of the kind ever constructed. The best authority is a unit of the opinion that a medium can not be too large for static currents. A million volts seems sedative or stimulative just as it is used. The greater the voltage the better the patient feels, provided the amperage remains insignificant. But this machine was too bulky for Dr. Gardner's office, and Dr. Kellogg who knows a good thing when he sees it, has ample room in the many appartments of the sanitarium for this big apparatus.

All sources, facts from all languages concerning radiant light gravitates into the AMERICAN X-RAY JOURNAL. Can an operator with a machine, and especially if he treats patients, be faithful to his trust if he does not read the AMERICAN X-RAY JOURNAL?

The autopsy on the late Dr. Christian Fenger confirmed a diagnosis made by skiagraph last fall. At that time Dr. Fenger had an attack of colic, which he thought might be due to gallstones, and a skiagraph taken, showed small, dark shadows in the region of the gall-bladder. At the autopsy, three gall-stones were found in this viscus.—*Exchange.*

Dr. Frank Alonzo Kirby, and Dr. C. E. Skinner of New Haven, Conn., report a case of round-celled sarcoma, successfully treated by x-ray exposures, after some of the eminent surgeons of the east declared it inoperable.

Dr. George Hopkins of Cleveland, reports a case of stone in the bladder, the presence of which evaded every conformatory means known to the profession, until the x-rays were brought into requisition.

X-Ray Therapy.

Read by request by H. P. Pratt, M. D., before the State Eclectic Medical Society, Chicago, May 21st, 1902.

X-ray therapy and electro-therapy are fundamentally the same, and the good results obtained are due to ionic changes in the tissues, or electrolization the body acting as an electrolyte.

Over six years has elapsed since the therapeutic value of the x-ray was first discovered, and hundreds of patients have been treated with this force, with varied results, no two experts agreeing on any one method of treatment. It has been somewhat of a go-as-you-please affair, and as only a few had any understanding of the nature of this force, it was hit or miss, and by far more misses than hits. The bulk of the work done in this line has been within the last year. It almost seems now that every physician and electrician who has enough money to purchase an apparatus for the work, is posing as an expert, and is treating patients without the slightest knowledge of, or experience in, this line of work. These supposed experts, after six or eight weeks of experimental work, send reports to medical journals with pictures taken before and after of a patient that they succeeded in curing of "lupus" or "epithelioma;" when, in fact all the time they were giving potassium iodid. On the other hand when they come across a genuine case of lupus or cancer they fall down. This kind of work is what has given a black eye to x-ray therapy. In the hands of a genuine expert, (and these are very scarce), excellent results can be obtained.

We must not be carried away with the idea that the x-ray is a cure-all. If we do, we will very soon discover our mistake. It has its field of usefulness, and a great field it is, too. We also must allow time for recurrences, for we will certainly have them. But if all the reports published in the different medical journals, both here and abroad, prove to be correct, then there must be a radical change in some of our surgical procedures. Time will tell.

I believe it was the celebrated Dr. Agnew who said: "I do not remember a single case of cancer operated on by me that was cured." Since then a number of surgeons have expressed themselves in a similar manner. Now if this is true, why do they operate? They say it is simply to take away the mass of infectious material to prevent further absorption of the septic mass, to prolong life, not to cure the disease.

So long as the knife is used, so long we will be kept in ignorance of a rational treatment. If the surgeon would refrain from cutting until it is necessary, then it would give an opportunity for the study of other methods. I am not posing here as a surgeon, nor do I claim to know anything more than the average practitioner about surgical procedure, but I have some knowledge of x-ray therapeutics, having in the last six years given over 25,000 treatments.

The force from the x-ray is electric in character and of a very high potential. It acts on matter in the same manner as any electro-motive force, that is to say, it produces a dissociation of molecules along its lines of force, meaning ionic changes or electrolysis. All substances through which the x-ray passes form part of the x-ray circuit. The body is part of the x-ray circuit, and is an electrolyte. I want to say right here that the x-ray is not of itself and directly any more a germicide or bactericide than the sun. We depend entirely upon the ions liberated through the electrolysis of the tissues and contained materials, which bring about a splitting up or decomposition of the bacteria or the cancer cells.

This is why it is very essential to properly feed your patients and give them the class of remedies which are active and readily decomposed, so that the free ions will attack and decompose the bacteria, or assist in destroying the cancer. My theory is that the body, which is composed mainly of 15 of the 80 odd elements, each element is an independent center of force; that it is the association of one element with another which gives to us all forms of matter known as compound; that all physiological changes are due to the difference in the electrical pull of the ions; and that when the x-ray is applied to the body it decomposes the compounds into their elementary structure, and recombination takes place in the direction of the stronger electrical pull. This theory of the difference of electrical pull was advanced by me and published in the Alkaloidal Clinic, November, 1899, and in the Annual Eclectic Medicine and Surgery, Vol. VI, 1895.

I do not question that the x-ray is antiseptic; but it is not a germicide or bactericide unless there are enough ions liberated through electrolysis to bring about a decomposition of the bacteria or the cancer cells. In the bacteriology of Lehman and Neuman on page 29 is given the chemical composition of bacteria, which is almost identical with that of the tissues of the human body. It is highly probable that the composition of the protozoon of cancer is similar.

The therapeutic properties of the x-ray may be summed up as follows: 1. The x-ray through the liberation of the ions, hastens physiological changes, or metalbolism, causing a temporary rise in temperature and an increased elimination of waste products by the lungs, skin and kidneys; at the same time increasing the activity of the phagocytes. 2. The x-ray is an antiseptic, due to electrolytic changes producing ozone. 3. The x-ray is a germicide and bactericide only through the liberation of the ions (which is electrolysis) along its lines of force.

The x-ray treatment is not the only electrical treatment used for cancer, but I think in time it will be more potent than the other method. The well known Parson's method, which has been in vogue for the last few years, seems to be very effectual and has, in comparison with the knife, a less number of recurrences. It consists in passing a heavy current through the body of the cancer by means of platinum or gold needle electrodes for several seconds. It is known sometimes as the flash method. The patient must be under an anesthetic, as the treatment is very painful. A current of from 300 to 600 milliamperes or more is used. It is not strength of current that kills the cancer cells; it is the current density, corresponding to an increased number and concentration of the lines of force within a given space. Wherever the lines of force strike the cancer even with a reasonably weak current it will decompose that portion of the cell. This is accomplished much more readily by the x-ray, as there are a large number of lines of force thrown off from the tube.

The reason why the Parsons method is not practiced more is because it requires an expert electrician to manipulate it, and it is painful as well as dangerous.

During the excitement following the discovery of the x-ray, and especially after its therapeutic properties were discovered, I was flooded with inquiries relating to its use. I at that time had material to work on; so, on April 13, 1896, I placed under the ray two patients suffering with cancer of the stomach. I did not expect marvelous results; in fact I did not know what to expect. I

treated them daily for over four weeks and was surprised to find out how quickly the x-ray relieved them of pain. One of the patients had hemorrhages every three or four days. They ceased after the third treatment. These patients came to me without knowledge of their physician whom afterwards they consulted. He advised immediate operations. In all probability they were operated upon and are dead by this time. It was almost impossible at that time to secure other patients suffering with cancer, for every surgeon advised operation as giving the only hope of relief, so it was not until later in the year that I managed to treat a few private patients who would not be operated on and who were referred to me by their family physician. In April and May, 1896, I treated quite a number of patients suffering from tubercular troubles, namely, pulmonary tuberculosis, and tuberculosis of the glands, joints, etc., some of whom died and some are living today. Some of the case were reported by Dr. Finley Ellingwood in the Chicago Medical Times of July, 1896.

From the fact that these and other cases have already been published, I will confine myself now to a few typical cases since that date.

On June 8, 1896, Dr. John B. Murphy of Chicago, referred to me for treatment a patient suffering from Lupus Vulgaris, with the following letter: "Why are you trying to treat pulmonary tuberculosis before you undertake to treat the simpler form, that of Lupus Vulgaris?" The patient continued treatment for about three months when she was discharged as cured. This is without doubt the first case of lupus treated and cured with the x-ray.

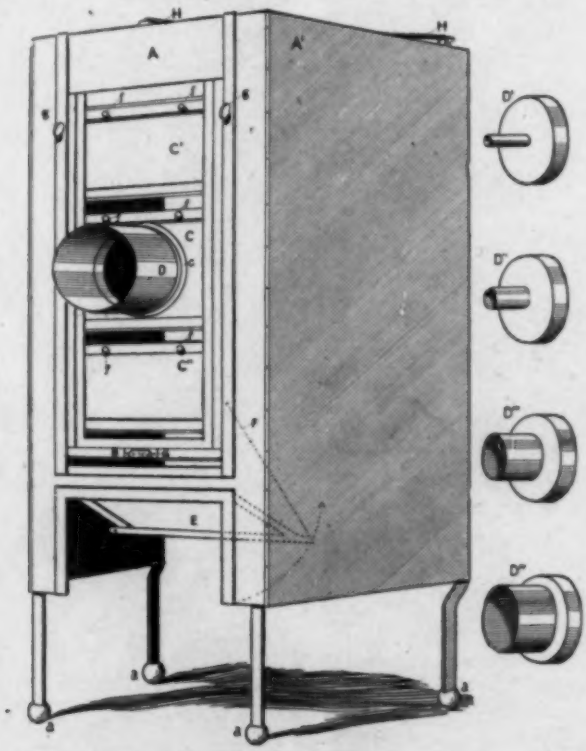
On October 21, 1896, Dr. Finley Ellingwood referred to me a patient suffering from tuberculosis of the kidney. She was discharged cured by the doctor in about four months. There was one thing peculiar about this case that after each treatment the patient had quite a severe hemorrhage from the kidney. I learned through Dr. Ellingwood a short time ago that she is in good health—absolutely well.

Miss A. was referred to me by Dr. Ochsner, the family physician being Dr. John Bartlett of Chicago. The patient was operated on by Dr. C. W. Johnson at the Swedish Home of Mercy on November 20, 1900, for what was supposed at the time to be an abscess of the bon A microscopical examination was made at the Rush Medical College, and the slides are in the possession of Dr. C. H. Parks with diagnosis that it was a small round-celled Osteo-Sarcoma. The x-ray treatments were given three times a week from January 12, 1901 until March 12. She left the hospital on March 14, was taken home and sent from there to the Passavant Memorial Hospital. March 26, 1901, the limb was amputated by Dr. Fenger and on June 27, 1901, another operation was performed. The patient has fully recovered and there are no symptoms of any recurrence of the Sarcoma. The question is whether in this case the success was due to the method of treatment, first using the x-ray as we did for a certain period of time, then following that up with an operation, with treatment after. All the surgeons that examined the case and followed it up from the first agreed that if it had not been for the x-ray the patient would not have lived; and even Dr. Fenger, I understand, concurred in this opinion.

. I have under treatment a number of cases of Sarcoma, two or three of which have been cured, but they were taken in time. Another has been under my treatment for over six months; she is no worse and I think she is getting a little better. The surgeon that referred

the case to me for treatment informed me that if it had not been for the x-ray she would have been dead before this, and if he had operated it would have recurred, and death would have followed very closely.

Now by utilizing the x-ray, and with the judicious use of the knife, we may be able to control malignant troubles heretofore incurable. I think that if we take for instance Carcinoma of the stomach, treat it with the x-ray for a certain length of time, operate on the patient for the septic mass which has been destroyed or partially destroyed, in order to prevent further absorption, and use the x-ray afterward for a period of several months, we may be able to cure internal cancer. The object of the operation is to take away the mass of septic material which is poisoning the system. This will also hold good in all the other cases where a mass of septic material is present. I will say here as a final conclusion that all superficial cancers, as well as Lupus Vulgaris, can be successfully treated without the use of the knife. I am very much inclined to think that it is advisable on all deep cancers to use the x-ray and then follow up the treatment with a radical operation, following this with the x-ray for several months. It is necessary in all cases, whether of a tubercular or malignant type, to give the necessary medicine to assist nature by supplying her with sufficient material to assist the x-ray to do its work. In the treatment of tubercular glands, I am in the habit of using a celluloid screen with a 10 per cent solution of creosote to be applied to the gland. This celluloid screen is an invention of Dr. Alexander Weiner of this city and it takes the place of col-



lodion as a form of dressing in treating tubercular cases. Where there is a persistent cough a 5 per cent tincture of opium in combination with the creosote can be used. The x-ray facilitates the absorption of the remedies. This is known as Cataphoresis.

Clinically the effects of x-ray treatment of a malignant tumor are as follows:

1. Relief of pain,
2. The growth of the tumor ceases,
3. The edges and surface soften,
4. It decreases in size,
5. Adhesions are reduced so that the tumor becomes moveable,
6. The whole mass becomes elastic to the touch, softens, and
7. Gradually disappears.

During treatment by the x-ray a metallic screen should be used large enough to protect both patient and operator from any injurious effects of the rays.

(This paper was accompanied by demonstrations, the apparatus for which was provided by Nafis & Co. and Frank S. Betz & Co., Chicago.)

AN X-RAY SCREEN.

In treating patients for malignant growths in which frequent and prolonged exposure is required, some efficient means of protecting the healthy tissues is absolutely necessary.

The operator himself if exposed repeatedly to even a mild amount of the x-radiance may suffer considerable injury, as many experimenters have found to their cost.

At a recent meeting of the Chicago Electro-Medical Society, Dr. H. P. Pratt exhibited a screen designed for the protection of both operator and patient. The screen is made of sheet steel and can be folded into small compass when not in use. It consists essentially of a vertical sheet steel frame, A 1½ meter high, ¾ meter wide, supported on feet a,a, with two steel wings A′ A″ of the same size; steadied at the top by two braces H. At the bottom of the frame A is a hinged door E, supported by a chain F, which is for the purpose of protecting the feet and knees of the patient when he sits facing the machine.

In the frame A, is a window with a vertical sliding front B, with its handle G, and set screws g, g. This sliding front contains three sliding shutters C, C,′ C,″ with knobs f; in one of which is a flanged opening 20 centimeters (8 inches) in diameter. Over this flange c, is fitted one of five interchangeable caps D, D,′ D,″ D,‴ D,⁗ each with a circular opening to which is added for convenience a flange. The openings vary in diameter from 2½ to 15 centimeters (1 to 8 inches) and enable the operator to confine the rays to the region in which an exposure is desired.

Behind the sliding front it fitted a transparent celluloid sheet ⅛″ thick, filling up the whole window. This sheet is between the tube and the patient during exposure and prevents the projection of particles of dust and other septic matter from the outside of the tube to the surface of the patient's body.

Since using this protection Dr. Pratt has had no trouble on account of x-ray burns, even in cases in which exposure has been pushed to an extreme degree in order to destroy malignant growths.

Dr. D. J. Hayes presents a neat paper on the Diagnosis of stone in the Bladder, Kidney and Ureter, by the x-ray, also presenting three radiographs, which show remarkably good results. The writer strenuously points out what the successful use of the x-ray has done away with, the necessity of a diagnostic incision for renal and urethral calculus with its risks, which heretofore has been the mode.

Dr. G. H. Rodman and Dr. T. C. Squarice report cases of long standing Lupus Vulgaris treated by the application of the x-rays.

X-Ray Divergence Chart.

SUPPLEMENT TO

A System of Instruction in X-Ray Methods and Medical Uses of Light, Hot-Air, Vibration and High Frequency Currents.

By S. H. MONELL, M. D.

Students of X-Ray work should study this chart reprocuced on the front cover of this Journal.

This chart shows at a glance the following points of essential interest to the X-Ray operator:—

1. A Plane Diagram of X-light radiations from the *anode* focus-point.
2. The rate of departure of X-Rays from a parallel path at different distances from the tube.
3. The proportionate loss of right-angle shadows at different distances horizontal to the perpendicular axis.
4. The area of non-distorted field of observation at any distance from the tube.
5. The area within which a body of any thickness will shadow a right-angled relation of the parts at a given distance from the tube.
6. The distance from the tube at which a part and the photographic plate must be exposed to secure essential correctness and non-distortion for a diagnostic field of any given size.
7. The general area of approximate non-distortion on the plate.
8. The obliquity of shadows at all distances outside of the central field of exact perpendicularity of radiation.

The scale of the Chart reads down from the focus-point of the tube to an imaginary plate twenty inches distant. For greater distances, extend the indicated lines below the Chart, and apply the same rale of interpretation. For full explanatory description see Chapter XVIII.